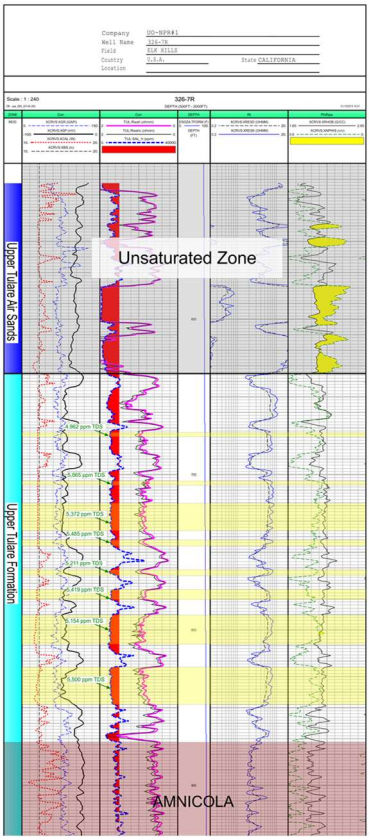
CLASS VI CRITICAL PRESSURE CALCULATION
ELK HILLS A1-A2 PROJECT

Critical Pressure Calculation

Upper Tulare USDW Inputs

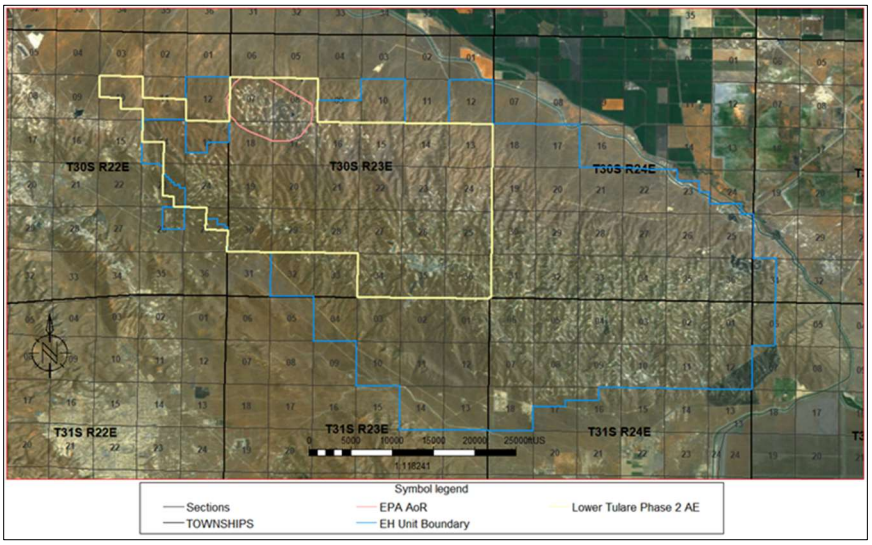
The unconfined Upper Tulare Formation USDW within the area of review (AoR) onlaps onto the anticline structure. As such, there are areas within the project with no USDW. The hydraulic head and depth is based on the 326-7R type well (Figure 1). Water levels with the Upper Tulare USDW are variable and have historically been falling. As such, water presence, depths and thickness for the Upper Tulare USDW are conservative. Calculated salinities are annotated for each sand in the Upper Tulare.

Figure 1: Well 326-7R type well of the Upper Tulare Formation USDW.



The Lower Tulare Formation has been approved as an exempt aquifer, the area approved is shown in Figure 2. North of the AoR the USDW is not defined as the Upper Tulare Formation but the Lower Tulare.

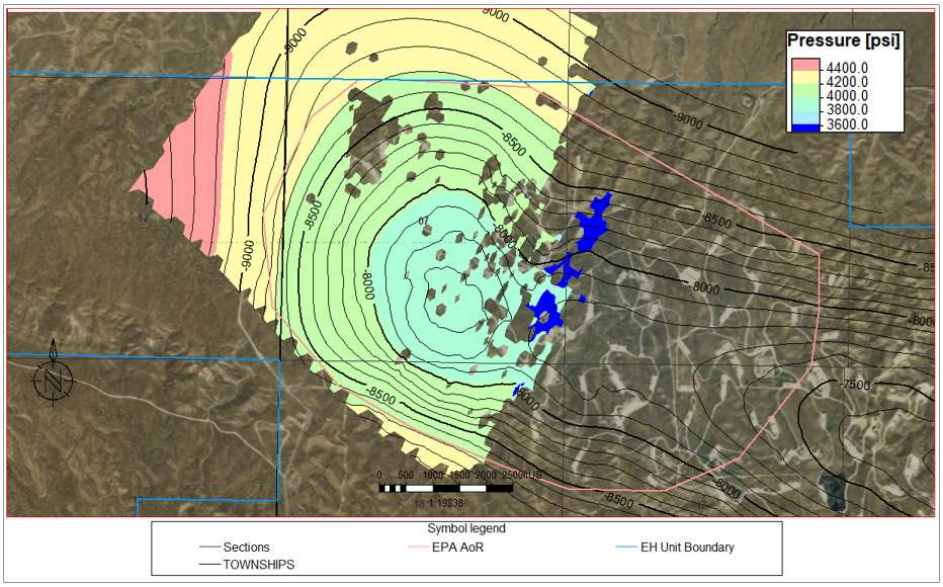
Figure 2: Lower Tulare aquifer exemption area.



Computational Modeling Monterey Formation A1-A2 Pressure

The Monterey Formation A1-A2 reservoir has been depleted by oil and gas production. Currently the pressure of the reservoir is 200-300 PSI. The final CO_2 reservoir pressure will be at or below the initial reservoir conditions (4,000 PSI). The pressure for the reservoir post injection based on computational modeling results is shown in Figure 3.

Figure 3: Monterey Formation A1-A2 structure map showing computational modeling reservoir pressure post-injection (top layer of the model). In the eastern portion of the AoR the reservoir sands grade to shale for the top layer of the model so the reservoir pressure is not determined.



Critical Pressure Calculation

Using the equation below, the critical pressure for the Monterey Formation A1-A2 reservoir is 3,400 PSI (Figure 4).

$$\frac{P_{i,f}}{\rho_i g} + z_i = \frac{P_u}{\rho_u g} + z_u$$

Where,

$P_{i,f}$ – Injection zone Pressure

P_u – Base of USDW zone pressure, 227' hydraulic head (equivalent to 677,692Pa or 98psi)

ρi – injection zone brine density, 1014 kg/m3

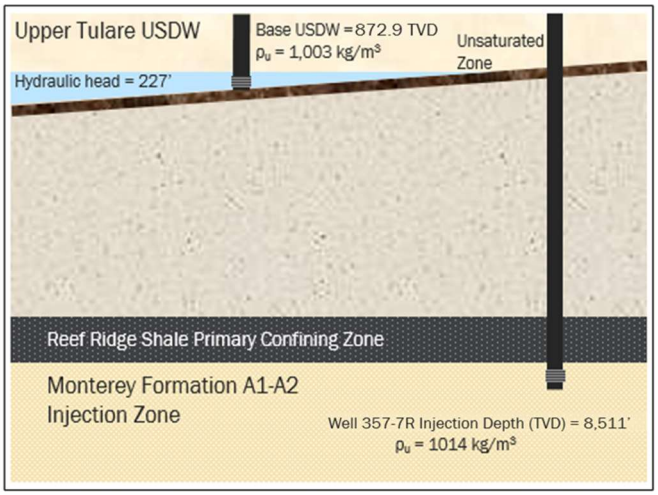
ρ_u – USDW zone water density, 1003 kg/m3

Zi – Injection zone depth 8,511 ft TVD or 2,594m TVD

Zu – Base of USDW zone depth, 872.9 ft TVD or 266m TVD

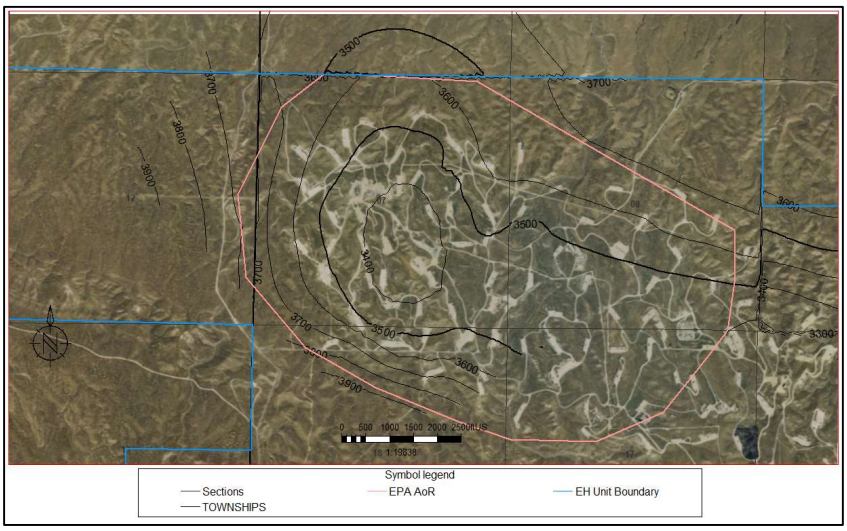
g – acceleration due to gravity, 9.81m/s2

Figure 4: Schematic section of the storage site with inputs to critical pressure calculation. Values for the USDW are based on the 326-7R well. The injection depth is based on the 357-7R injector. Using data from wells 357-7R injector and 326-7R the critical pressure is 3,458 PSI.



Critical pressure calculated for the reservoir is shown in Figure 5 using the Monterey Formation A1-A2 reservoir top and Base USDW and comes out to 3,458psi.

Figure 5: Critical pressure map in PSI using the Base USDW and Monterey Formation A1-A2 surfaces. Note that across the Elk Hills boundary the base of USDW is defined by the Lower Tulare instead of the Upper Tulare, resulting in a change in the contours.



Summary of AoR

The final pressure of the Monterey Formation A1-A2 reservoir will be at or below the initial reservoir pressure to ensure that CO_2 occupies the same pore space that was initially saturated with hydrocarbons and the pressure front is at equilibrium with initial conditions. As such, CTV defines the AoR as the aerial extent of the CO_2 plume.